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The Effects of COVID-19-Related Stressors on Bruxism and Temporomandibular Disorders

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Samantha Smith & Hagir Saleh

The Start of the Pandemic

- In December 2019, the World Health Organization was notified that a “novel viral pneumonia” was identified in Wuhan, China.[1]
- In a few short months, COVID-19 (novel coronavirus), had rapidly grown into a pandemic and altered many aspects of daily living.[1]
- Growing concerns have impacted people’s lives resulting in an environment of excessive anxiety and stress.[2]

Image by fernando zhiminaicela from Pixabay

johnstocker_vector. Download Covid 19 Global Pandemic Poster for free [Internet]. Vecteezy. vecteezy; 2020 [cited 2021Mar29]. Available from: https://www.vecteezy.com/vector-art/834588-covid-19-global-pandemic-poster

The Increase in Stress

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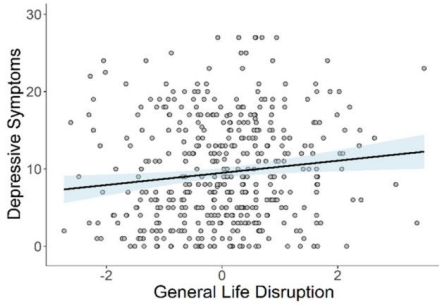
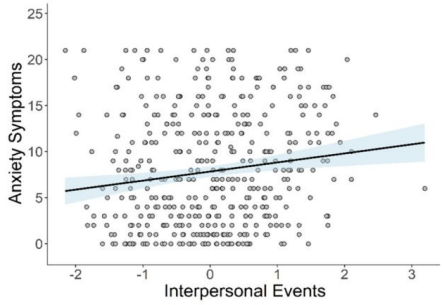
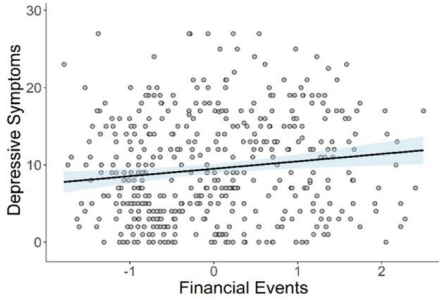
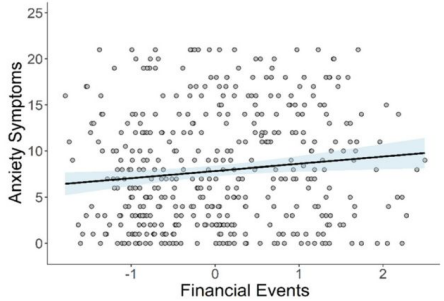
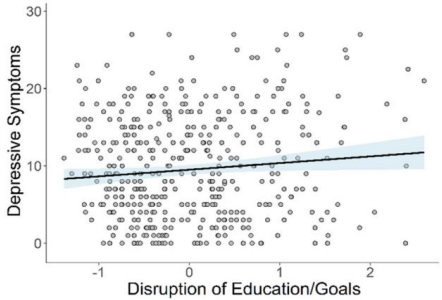
- The American Psychological Association (APA)
  - Results: Stress levels for U.S. adults were substantially higher in all three months of 2020 (May, June, and July) than in 2019.[3]
  - This “the first significant increase in average reported stress since the survey began in 2007.”[3]
- The Census Bureau and the National Center for Health Statistics
  - About 900,000 people.
  - Ages 18 and older in the US.[3]
  - Results: young adults, those with lower incomes, and unemployed individuals have higher rates of depression and anxiety.[3]

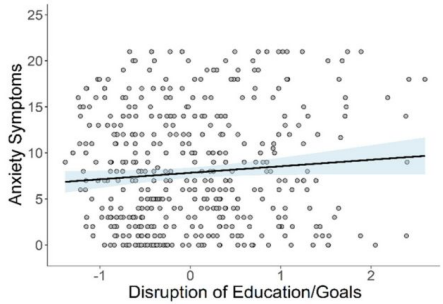








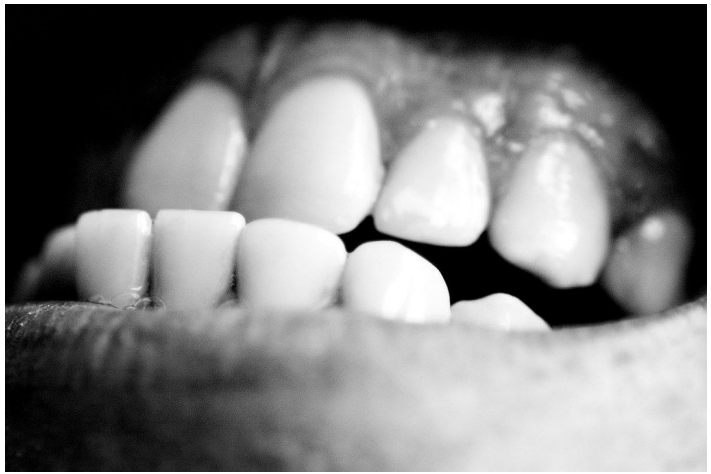




Kujawa A, Green H, Compas BE, Dickey L, Pegg S. Exposure to COVID-19 pandemic stress: Associations with depression and anxiety in emerging adults in the United States. Depress Anxiety. 2020 Dec;37(12):1280-1288. doi: 10.1002/da.23109. Epub 2020 Nov 10. PMID: 33169481.33086023.

Stress and Oral Health

- There is a significance between “psychosocial” aspects and the retention/new occurrence of temporomandibular disorders.[5]
- Individuals are six times more likely to grind/clench while awake if the individual is experiencing an increased amount of stress.[5]
- Dysfunctional oral habits and bruxism is believed to cause myofascial pain, leading to discomfort in the ears, neck, head, and masculatory musculature.[6]



Problem

COVID-19 has shown to be a major public health emergency, with an array of physical and emotional complications. While COVID-19 has its own effects on the human body, anxiety induced by the pandemic has shown to take a toll on the human oral cavity by means of causing individuals to grind and clench their teeth due to anxiety/stress, potentially leading to temporomandibular disorders and orofacial pain.

Businessman Business Problem By Gan Khoon Lay In the Bad Business Day Collection

Research Goal

To research the relationship between anxiety and stress related to the COVID-19 pandemic.

To examine the impact of COVID-19-related stressors on bruxism and temporomandibular disorders.

To educate the public on the relationship between mental health and oral health.

Methods

File:Research Scene Vector.svg [Internet]. Wikimedia Commons. [cited 2021Apr22]. Available from: https://commons.wikimedia.org/wiki/File:Research_Scene_Vector.svg

- Review of literature conducted using the following databases:
  - Academic Search Complete
  - Google Scholar
  - PubMed
  - Dentistry and Oral Sciences Source
- Key Words: COVID, coronavirus, clenching, grinding, temporomandibular disorders, fear, stress, bruxism
- Articles published in 2016 or newer

Methods Cont.

Right Or Wrong Clipart - Inclusion And Exclusion Criteria Icon, HD Png Download - 806x539 PNG [Internet]. Dlf.pt. [cited 2021Mar29]. Available from: https://www.dlf.pt/ddetail/hJwoJTR_right-or-wrong-clipart-inclusion-and-exclusion-criteria/

- Inclusion criteria: articles published in English, articles published in and since 2016, articles available on a credible database (Academic Search Complete, PubMed, etc.), articles focusing on the psychological effects of COVID-19
- Exclusion criteria: articles not relating to the oral cavity and surrounding structures

Results

Soares et al

- Goal: To determine the prevalence of bruxism in students.
- Sample: 253 students ages 18 to 30 of both genders.
- Method: The students were clinically examined and answered a questionnaire.
- Results: “31.6% of the students had bruxism” and stress and temporomandibular joint pain were some of the risk factors associated wit bruxism ($p < 0.001$).[7]
- Strengths:
    - Significant sample size representative of the population.
    - Proportionally stratified sample.
    - “Only one properly trained examiner performed all evaluations.”[7]
- Conclusion: Students who experience stress and muscle pain had a 3 times greater chance of developing bruxism irrespective of age and gender.[7]

Table 4. Association between bruxism and complaints ($n = 253$ subjects).

	Bruxers		Non-bruxers		
	n	%	*n*	%	*p-value*
Symptoms of stress, fatigue or anxiety					
Yes	72	90.0	121	69.9	<0.001
No	8	10.0	52	30.1	
Muscle pain in the head, face, and neck					
Yes	37	46.3	28	16.2	<0.001
No	43	53.8	145	83.8	
Noise in the temporomandibular joint					
Yes	32	40.0	31	17.9	<0.001
No	48	60.0	142	82.1	
Pain in the temporomandibular joint					
Yes	25	31.3	18	10.4	<0.001
No	55	68.8	155	89.6	

Note: Chi-square test.

Soares LG, Costa IR, Brum Júnior JDS, Cerqueira WSB, Oliveira ES, Douglas de Oliveira DW, Gonçalves PF, Glória JCR, Tavano KTA, Flecha OD. Prevalence of bruxism in undergraduate students. Cranio. 2017 Sep;35(5):298-303. doi: 10.1080/08869634.2016.1218671. Epub 2016 Aug 12. PMID: 27684574.

Emodi-Perlman et al.

- Cross-sectional online study given in Poland and Israel: 1096 responses in Poland, 867 responses in Israel
- Influx in the rate of symptoms related to temporomandibular disorders and bruxism as a result of the psychological and emotional effects of the COVID-19 pandemic.[8]
- Results:
    - “unlike the Polish participants, the worry of being contaminated by the virus did not increase the odds of occurrence of AB [awake bruxism] and SB [sleep bruxism], or aggravate the symptoms of the conditions (TMD [temporomandibular disorders], SB, and AB) among the Israeli subjects.”[8]
    - “. . . [t]he effects of emotional factors and of personal concerns on the associated symptoms and their aggravation were found to be similar in both countries.”[8]
    - Likelihood of exhibiting bruxism or a temporomandibular disorder grew notably as a result of depression, anxiety, or generalized concern regarding factors such as well-being and financial aspects of life.[8]

Temporomandibular Disorders and Bruxism Outbreak as a Possible Factor of Orofacial Pain Worsening during the COVID-19 Pandemic-Concomitant Research in Two Countries

Alona Emodi-Perlman [1], Ilana Eli [1], Joanna Smardz [2], Nir Uziel [1], Gniewko Wieckiewicz [3], Efrat Gilon [1], Natalia Grychowska [4], Mieszko Wieckiewicz [2]

Affiliations + expand

PMID: 33053640 PMCID: PMC7601612 DOI: 10.3390/jcm9103250

Free PMC article

Abstract

Background: In late December 2019, a new pandemic caused by the SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) infection began to spread around the world. The new situation gave rise to severe health threats, economic uncertainty, and social isolation, causing potential deleterious effects on people's physical and mental health. These effects are capable of influencing oral and maxillofacial conditions, such as temporomandibular disorders (TMD) and bruxism, which could further aggravate the orofacial pain. Two concomitant studies aimed to evaluate the effect of the current pandemic on the possible prevalence and worsening of TMD and bruxism symptoms among subjects selected from two culturally different countries: Israel and Poland.

Materials and methods: Studies were conducted as cross-sectional online surveys using similar anonymous questionnaires during the lockdown practiced in both countries. The authors obtained 700 complete responses from Israel and 1092 from Poland. In the first step, data concerning TMDs and bruxism were compared between the two countries. In the second step, univariate analyses (Chi^2) were performed to investigate the effects of anxiety, depression, and personal concerns of the Coronavirus pandemic, on the symptoms of TMD, and bruxism symptoms and their possible aggravation. Finally, multivariate analyses (logistic regression models) were carried out to identify the study variables that had a predictive value on TMD, bruxism, and symptom aggravation in the two countries.

Results: The results showed that the Coronavirus pandemic has caused significant adverse effects on the psychoemotional status of both Israeli and Polish populations, resulting in the intensification of their bruxism and TMD symptoms.

Conclusions: The aggravation of the psychoemotional status caused by the Coronavirus pandemic can result in bruxism and TMD symptoms intensification and thus lead to increased orofacial pain.

Keywords: COVID-19; SARS-CoV-2; bruxism; coronavirus pandemic; orofacial pain; temporomandibular disorders.

Emodi-Perlman A, Eli I, Smardz J, Uziel N, Wieckiewicz G, Gilon E, Grychowska N, Wieckiewicz M. Temporomandibular Disorders and Bruxism Outbreak as a Possible Factor of Orofacial Pain Worsening during the COVID-19 Pandemic-Concomitant Research in Two Countries. J Clin Med. 2020 Oct 12;9(10):3250. doi: 10.3390/jcm9103250. PMID: 33053640; PMCID: PMC7601612.

Antonio De Medeiros et al.

- Cross-sectional study, conducted among dental students at Faculty of Health Sciences of the University of Brasilia.[9]
- 113 survey responses analyzed, conducted through email and social media from May 12 through May 19, 2020.[9]
- Positive correlations existed between anxiety and oral habits, depression and oral habits, and symptoms of temporomandibular disorders and oral habits.[9]
- Null hypothesis: There is not an association between symptoms related to depression, anxiety, or temporomandibular disorders and oral habits.[9]
    - Symptoms of anxiety and oral habits: p-value = 0.001
    - Symptoms related to temporomandibular disorders and oral habits: p<0.001
    - Depression symptoms and oral habits: p = 0.021
- Conclusion: occurrence of symptoms related to depression, anxiety, and temporomandibular disorders were affected by isolation as a result of the COVID-19 pandemic.[9]

Prevalence of symptoms of temporomandibular disorders, oral behaviors, anxiety, and depression in Dentistry students during the period of social isolation due to COVID-19

Rodrigo Antonio De Medeiros [1], Danielle Leal Vieira [1], Emily Vivianne Freitas Da Silva [2], LilianA Vicente Melo De Lucas Rezende [1], Rodrigo Wendel Dos Santos [3], Lucas Fernando Tabata [1]

Affiliations + expand

PMID: 33263648 PMCID: PMC7714260 DOI: 10.1590/1678-7757-2020-0445

Free PMC article

Abstract

Objective: Temporomandibular dysfunction (TMD), anxiety, and depression are disorders that, due to the current lifestyle, are affecting an increasing portion of the population. Investigating the prevalence of the symptoms of these disorders during the quarantine due to the coronavirus 2019 pandemic (COVID-19) is important to outline clinical strategies for patient care. This study assessed the prevalence of TMD symptoms, anxiety, depression, and oral behaviors and their associations during the social isolation due to COVID-19.

Methodology: Questionnaires were used to assess TMD symptoms in accordance with the Diagnostic Criteria for Temporomandibular Disorders: clinical protocol and assessment instruments, a questionnaire to verify oral behaviors and Hospital Anxiety and Depression Scale to assess symptoms of anxiety and depression in students of dentistry at the Faculty of Health Sciences of the University of Brasília in May 2020. Qualitative data were subjected to descriptive statistics and chi-squared analysis ($p<0.05$). The relationship between quantitative and qualitative data was evaluated using Spearman's rho correlation ($p<0.05$).

Results: There was a high prevalence of TMD symptoms, anxiety, and depression in the participants, resulting in association between gender and anxiety symptoms ($p=0.029$). There was a positive

Medeiros RA, Vieira DL, Silva EVFD, Rezende LVML, Santos RWD, Tabata LF. Prevalence of symptoms of temporomandibular disorders, oral behaviors, anxiety, and depression in Dentistry students during the period of social isolation due to COVID-19. J Appl Oral Sci. 2020 Nov 30;28:e20200445. doi: 10.1590/1678-7757-2020-0445. PMID: 33263648; PMCID: PMC7714260.

Saccomanno et al.

Coronavirus Lockdown as a Major Life Stressor: Does It Affect TMD Symptoms?

Sabina Saccomanno [1], Mauro Bernabei [2], Fabio Scoppa [3 4], Alessio Pirino [5], Rodolfo Mastrapasqua [6], Marina Angela Visco [7]

Affiliations + expand

PMID: 33266130 PMCID: PMC7731003 DOI: 10.3390/ijerph17238907

Free PMC article

Abstract

Temporomandibular disorders are multi-factorial conditions that are caused by both physical and psychological factors. It has been well established that stress triggers or worsens TMDs. This paper looks to present early research, still unfolding, on the relationship between COVID-19 as a major life stressor and TMDs. The main aims of this study were to: investigate the presence of symptoms related to TMDs and the time of onset and the worsening of painful symptoms in relation to the changes in social life imposed by the coronavirus pandemic; and to evaluate the perception of COVID-19 as a major stressful event in subjects who report worsening of painful TMD symptoms. One hundred and eighty-two subjects answered questionnaires-Axis II of the RDC/TMD, the PSS, and specific items about coronavirus as a stressful event-during the lockdown period for COVID-19 in Italy to evaluate the presence of reported symptoms of TMD and the level of depression, somatization, and stress perceived. The results showed that 40.7% of subjects complained about TMD symptoms in the past month. Regarding the time of onset, 60.8% of them reported that facial pain started in the last three months, while 51.4% of these subjects reported that their symptoms worsened in the last month and were related to the aggravation of pain due to the coronavirus lockdown as a major life event and to the stress experienced. The results of this study seem to support the hypothesis that stress during the pandemic lockdown influenced the onset of temporomandibular joint disorders and facial pain, albeit with individual responses.

Keywords: COVID-19; lockdown; orofacial pain; stress; temporomandibular disorders.

Saccomanno S, Bernabei M, Scoppa F, Pirino A, Mastrapasqua R, Visco MA. Coronavirus Lockdown as a Major Life Stressor: Does It Affect TMD Symptoms? Int J Environ Res Public Health. 2020 Nov 30;17(23):8907. doi: 10.3390/ijerph17238907. PMID: 33266130; PMCID: PMC7731003.

- Online survey conducted in Italy from April 18, 2020 through May 3, 2020; 182 respondents.[10]
- Methods of analysis:
  - Perceived Stress Scale
  - Research Diagnostic Criteria for Temporomandibular Disorders Axis II.
  - Questions relating to stress from COVID-19 and facial discomfort
- Results: within the past month (relative to when the study was conducted), 40.7% (74/182) of respondents reported discomfort in the jaw, temples, or face.[10]
  - 74.3% of these respondents were women
  - 51.4% of those experiencing discomfort reported that their level of discomfort ***increased*** over the past month.[10]
    - 94.7% of these respondents also noted that there was a relationship between a ". . .recently occurring major life event" and their increase in discomfort.[10]
      - 45.7% of these individuals loosely hinted at COVID-19 being the event that was the source of their recent increase in facial discomfort.[10]

Asquini G et al

Abstract

This study aimed to understand the impact of COVID-19 distress on psychological status, features of central sensitization and facial pain severity in people with temporomandibular disorders (TMDs). In this prospective cohort study, 45 adults (19 chronic, 26 acute/subacute TMD) were recruited prior to the COVID-19 outbreak. Baseline assessment took place before the outbreak while a follow-up was performed immediately after the lockdown period. Multiple variables were investigated including age, gender, perceived life quality, sleep quality, anxiety and depression, coping strategies, central sensitization, pain intensity, pain-related disability and oral behaviour. COVID Stress Scales (CSS) were applied at follow-up to measure the extent of COVID-related distress. CSS were significantly higher in those with chronic TMDs compared to those with acute/subacute TMDs ($p<0.05$). In people with chronic TMD, the variation in anxiety and depression from baseline to follow-up was significantly correlated with scores on the CSS ($r = 0.72$; $p = 0.002$). Variations of the central sensitization inventory ($r = 0.57$; $p = 0.020$) and graded chronic pain scale ($r = 0.59$; $p = 0.017$) were significantly correlated with scores on the CSS. These initial findings indicate that people with chronic TMD were more susceptible to COVID-19 distress with deterioration of psychological status, worsening features of central sensitization and increased chronic facial pain severity. These findings reinforce the role of stress as a possible amplifier of central sensitization, anxiety, depression, chronic pain and pain-related disability in people with TMDs

Asquini G, Bianchi AE, Borromeo G, Locatelli M, Falla D. The impact of Covid-19-related distress on general health, oral behaviour, psychosocial features, disability and pain intensity in a cohort of Italian patients with temporomandibular disorders. PLoS One. 2021 Feb 2;16(2):e0245999. doi: 10.1371/journal.pone.0245999. PMID: 33529226; PMCID: PMC7853459.

- Method: COVID Stress Scales (CSS) used to measure the extent of COVID-related anxiety, stress, and pain.[12]
- Limitations:
  - Lack of a control group.
  - Limited sample size of participants selected.
  - Unequal distribution of both groups.[12]
  - Conducted in only one Centre in one Country.[12]
  - Other relevant variables were not measured.
- Strengths:
  - Using a prospective study approach.[12]
  - The knowledge of how and if people with TMD were affected by COVID-19-related stress.[12]


Discussion

Strengths and Limitations

- Strengths:
  - Use of credible methods of analyzing and reporting data.
  - Variety of population samples from various places during the pandemic.
    - Different age ranges.
    - Inclusion of both genders.
  - COVID-19 related stressors have led to the increase and/or worsening of bruxism and TMD regardless of gender, age, and the presence of other etiological factors.
- Limitations:
  - Fairly new topic: limited research conducted.
    - studies conducted early in the COVID-19 pandemic - more longitudinal results needed
  - Studies conducted online: bias
  - Further longitudinal studies should be conducted to understand the relationship between COVID-19 stressors and orofacial disorders.

Future Directions/Implications

- Long-term exposure to elevated levels of anxiety is linked to both physiological and psychological costs that may be difficult to reverse.[6]
- Increase dental staff awareness.
- Public health measures
- Patient education in the dental chair
    - Other oral fixations other than grinding or clenching
        - Chewing gum
    - Occlusal guard
    - Botox injections (need to be repeated since it usually only lasts for 3–6 months)[2]
- Referrals
    - Mental healthcare providers in the area
- Building rapport with patients during stressful times
    - Being an advocate for the patient
        - Important to remain in scope of practice of RDH or DDS
            - Not licensed to give mental health counseling, however, dental professionals can listen to the patient and relate their mental health concerns to the oral cavity and in the increase in bruxism/TMJ pain

Image by Elf-Moondance from Pixabay

Conclusion

- Increase in stress and anxiety during the COVID-19 pandemic.
    - Development and intensification of bruxism and temporomandibular joint disorders.
- Awareness of dental professionals about impact of pandemic on orofacial disorders.
    - Researching the best treatment options and strategies for managing stress and reducing orofacial pain.
- It was concluded that the effect of one's psychological condition on the oral cavity and surrounding facial structures.
- Further research would need to be conducted to better understand the effects of COVID-19 stressors on bruxism and temporomandibular disorders.

References

1. Lee SA. Coronavirus Anxiety Scale: A brief mental health screener for COVID-19 related anxiety. Death Stud. 2020;44(7):393-401. doi: 10.1080/07481187.2020.1748481. Epub 2020 Apr 16. PMID: 32299304.
2. Hassan KA, Khier SE. Awake Bruxism Intensified During COVID-19 Pandemic by Cumulative Stress – An Overview. Journal of Clinical Research in Dentistry [Internet]. 2020Dec [cited 2021Mar3];3(1):1–3. Available from: https://www.researchgate.net/profile/Khamis-Hassan/publication/347907088_Awake_Bruxism_Intensified_During_COVID-19_Pandemic_by_Cumulative_Stress_-_An_Overview/links/5fe6970a45851553a0ef56f0/Awake-Bruxism-Intensified-During-COVID-19-Pandemic-by-Cumulative-Stress-An-Overview.pdf
3. Liu F, Steinkeler A. Epidemiology, diagnosis, and treatment of temporomandibular disorders. Dent Clin North Am. 2013 Jul;57(3):465-79. doi: 10.1016/j.cden.2013.04.006. PMID: 23809304.
4. Kujawa A, Green H, Compas BE, Dickey L, Pegg S. Exposure to COVID-19 pandemic stress: Associations with depression and anxiety in emerging adults in the United States. Depress Anxiety. 2020 Dec;37(12):1280-1288. doi: 10.1002/da.23109. Epub 2020 Nov 10. PMID: 33169481.33086023.
5. Talevi D, Socci V, Carai M, Carnaghi G, Faleri S, Trebbi E, di Bernardo A, Capelli F, Pacitti F. Mental health outcomes of the CoViD-19 pandemic. Riv Psichiatr. 2020 May-Jun;55(3):137-144. doi: 10.1708/3382.33569. PMID: 32489190.
6. Almeida-Leite CM, Stuginski-Barbosa J, Conti PCR. How psychosocial and economic impacts of COVID-19 pandemic can interfere on bruxism and temporomandibular disorders? J Appl Oral Sci. 2020;28:e20200263. doi: 10.1590/1678-7757-2020-0263. Epub 2020 May 11. PMID: 32401942; PMCID: PMC7213779.
7. Soares LG, Costa IR, Brum Júnior JDS, Cerqueira WSB, Oliveira ES, Douglas de Oliveira DW, Gonçalves PF, Glória JCR, Tavano KTA, Flecha OD. Prevalence of bruxism in undergraduate students. Cranio. 2017 Sep;35(5):298-303. doi: 10.1080/08869634.2016.1218671. Epub 2016 Aug 12. PMID: 27684574.
8. Emodi-Perlman A, Eli I, Smardz J, Uziel N, Wieckiewicz G, Gilon E, Grychowska N, Wieckiewicz M. Temporomandibular Disorders and Bruxism Outbreak as a Possible Factor of Orofacial Pain Worsening during the COVID-19 Pandemic-Concomitant Research in Two Countries. J Clin Med. 2020 Oct 12;9(10):3250. doi: 10.3390/jcm9103250. PMID: 33053640; PMCID: PMC7601612.
10. Medeiros RA, Vieira DL, Silva EVFD, Rezende LVML, Santos RWD, Tabata LF. Prevalence of symptoms of temporomandibular disorders, oral behaviors, anxiety, and depression in Dentistry students during the period of social isolation due to COVID-19. J Appl Oral Sci. 2020 Nov 30;28:e20200445. doi: 10.1590/1678-7757-2020-0445. PMID: 33263648; PMCID: PMC7714260.
11. Saccomanno S, Bernabei M, Scoppa F, Pirino A, Mastrapasqua R, Visco MA. Coronavirus Lockdown as a Major Life Stressor: Does It Affect TMD Symptoms? Int J Environ Res Public Health. 2020 Nov 30;17(23):8907. doi: 10.3390/ijerph17238907. PMID: 33266130; PMCID: PMC7731003.
12. Asquini G, Bianchi AE, Borromeo G, Locatelli M, Falla D. The impact of Covid-19-related distress on general health, oral behaviour, psychosocial features, disability and pain intensity in a cohort of Italian patients with temporomandibular disorders. PLoS One. 2021 Feb 2;16(2):e0245999. doi: 10.1371/journal.pone.0245999. PMID: 33529226; PMCID: PMC7853459.

References for Images

- Zhiminaicela F. [Internet]. Pixabay . 2020 [cited 2021Apr22]. Available from: https://pixabay.com/photos/covid-19-pandemic-coronavirus-5053095/
- johnstocker_vector. Download Covid 19 Global Pandemic Poster for free [Internet]. Vecteezy. vecteezy; 2020 [cited 2021Mar29]. Available from: https://www.vecteezy.com/vector-art/834588-covid-19-global-pandemic-poster
- Thank you for stopping by Donations welcome to support . [Internet]. Pixabay . 2017 [cited 2021]. Available from: https://pixabay.com/users/thedigitalartist-202249/?utm_source=link-attribution&utm_medium=referral&utm_campaign=image&utm_content=2902537
- Lay GK. Businessman Business Problem on The Noun Project [Internet]. The Noun Project. The Noun Project; [cited 2021Apr22]. Available from: https://thenounproject.com/term/businessman-business-problem/1923688/
- Heyer B. 016 - Funky Oral Fixation [Internet]. Creative Commons. CC BY-NC-SA 2.0; [cited 2021Apr22]. Available from: https://creativecommons.org/licenses/by-nc-sa/2.0/
- File:Research Scene Vector.svg [Internet]. Wikimedia Commons. [cited 2021Apr22]. Available from: https://commons.wikimedia.org/wiki/File:Research_Scene_Vector.svg
- Right Or Wrong Clipart - Inclusion And Exclusion Criteria Icon, HD Png Download - 806x539 PNG [Internet]. Dlf.pt. [cited 2021Mar29]. Available from: https://www.dlf.pt/ddetail/hJwoJTR_right-or-wrong-clipart-inclusion-and-exclusion-criteria/
- Elf-Moondance . [Internet]. Pixabay. 2021 [cited 2021Apr22]. Available from: https://pixabay.com/illustrations/doctor-nurse-patient-coronavirus-5947297/

Questions?

Virginia Commonwealth University

The Effects of COVID-19-Related Stressors on Bruxism and Temporomandibular Disorders

Samantha Smith & Hagir Saleh

Research Methods and Study Design (DENH 307)

Dr. Loughran

18 March 2021

Abstract

Problem: COVID-19 has proven to be a major public health emergency, with an array of physical and emotional complications. While COVID-19 has its own effects on the human body, anxiety induced by the pandemic has shown to take a toll on the human oral cavity by means of causing individuals to grind and clench their teeth due to anxiety/stress, potentially leading to temporomandibular disorders and orofacial pain.

Methods: A thorough review of literature was conducted by consulting credible studies published on online databases such as PubMed, Dentistry & Oral Sciences Source, Google Scholar, and Academic Search Complete. The studies examined were all conducted within the last five years (2016 and newer). Using key terms and phrases, a series of primary and secondary sources were analyzed in order to determine the effect of COVID-19 on bruxism and orofacial pain/temporomandibular disorders.

Major findings: Researchers have found a direct correlation between the increase of anxiety, stress, and fear during the COVID-19 pandemic and the increase in bruxism and facial pain.

Conclusions: In conclusion, the COVID-19 pandemic may result in the accumulation of emotional stress, which may have a profound impact on many aspects of health, including oral health. The studies have found that psychological factors such as stress and anxiety, associated with the Covid-19 pandemic, may lead to a greater risk of developing or worsening bruxism and temporomandibular joint disorders, which in turn would lead to increased orofacial pain. It has been encouraged that dental staff should pay more attention to the spread of such orofacial disorders during the pandemic. They should become more acquainted with the diagnostic methods of such disorders, their treatment options, and techniques for reducing stress to reduce the spread of such oral complications.

Introduction:

In December 2019, the World Health Organization was notified that a "novel viral pneumonia" was identified in Wuhan, China.[1] In a few short months, COVID-19 (novel coronavirus), had rapidly grown into a pandemic and altered many aspects of daily living.[1] COVID-19 has impacted the lives of many people, resulting in growing concerns and uncertainties among individuals. People have become afraid of losing their jobs, while others are afraid of becoming infected with the disease and dying.[2] "These concerns impacted people's mental health and created an environment of excessive anxiety and high levels of emotional stress."[2] Research has proven that there is an association between psychological symptoms related to mental-health issues and anxiety resulting from a pandemic.[1] Through designing a "Coronavirus Anxiety Scale," researcher S. A. Lee was able to determine from 775 adults with COVID-related anxiety that ". . . coronavirus diagnosis, impairment, alcohol/drug coping. . .extreme hopelessness, suicidal ideation, as well as attitudes toward[s] . . . Chinese products" were linked to higher scores on the Coronavirus Anxiety Scale.[1] According to a review conducted by Talevi et al., aspects of pandemics such as isolation can affect one's emotional response to pandemics as well as one's psychological state.[3] Anxiety, depression, stress, and dysfunctional actions are a few examples of how individuals psychologically respond to being in a pandemic.[3]

Additionally, it is noted that there is a significance between "psychosocial" aspects and the retention or new occurrence of temporomandibular disorders.[4] Especially in individuals with issues related to the masculatory musculature, those with temporomandibular disorders also prove to have an increased rate of psychological concerns.[4] Research has found that individuals

are six times more likely to grind/clench while awake if the individual is experiencing an increased amount of stress.[4] According to Frederick Liu, DDS et al, temporomandibular disorders can be classified as either a nonarticular or articular disorder.[5] Pain termed "myofascial" pain is responsible for over half of temporomandibular disorders.[5] Dysfunctional oral habits and bruxism is believed to cause myofascial pain, leading to discomfort in the ears, neck, head, and masculatory musculature.[5] Based on these reports, researching anxiety related to COVID-19 and its effects on bruxism and temporomandibular disorders would be relevant in order to educate the public on the oral effects of the pandemic and its psychological impacts.

Methods and Materials

In conducting a review of the literature, the following databases were consulted to find credible primary and secondary sources from notable scientific journals: PubMed, Dentistry and Oral Sciences Source, Academic Search Complete, and Google Scholar. The key word search items used included COVID, coronavirus, anxiety, fear, stress, bruxism, clenching, temporomandibular disorders, and grinding. The articles used for this review had to be published since 2016.

Results

To begin, the relationship between the COVID-19 pandemic and anxiety must be noted. Since 2007, the American Psychological Association (APA) has conducted annual stress surveys in the United States, and researchers were able to compare the causes of stress and the number/percentage of people experiencing stress from previous years (2017, 2018, 2019) to the monthly surveys conducted in 2020.[6] The survey found that stress levels for U.S. adults were substantially higher in all three months of 2020 (May, June, and July) than in 2019. This "marked the first significant increase in average reported stress since the survey began in 2007."[6]

Researchers also found that "parents of children under 18 were experiencing significantly more stress than other parents or adults with no children."[6] The Census Bureau and the National Center for Health Statistics surveyed about 900,000 people ages 18 and older in the United States on a weekly basis for three months to provide data on the impact of COVID-19. [6] On a weekly basis, the participants were asked to respond to four questions that are part of a standard screening method used to diagnose the risk of mental illness in order to measure their levels of anxiety and depression during the pandemic. According to the findings, young adults, those with lower incomes, and people who have lost their jobs as a result of the pandemic have higher rates of depression and anxiety.[6]

A study was conducted where researchers surveyed 287 young adults ages 18 to 25 who lived in the United States.[7] The participants were asked to answer a pandemic stress questionnaire (PSQ), which is a "25‐item measure of exposure to stressful events due to the COVID‐19 pandemic and subjective severity of events."[7] Based on this study, it was found that "symptoms of depression and anxiety were high overall" and "pandemic‐related stress was moderately associated with both depression and anxiety at each assessment"[7] The researchers concluded that "emerging adults are at high risk for depression and anxiety related to the psychosocial effects of the COVID‐19 pandemic."[7] However, this study did acknowledge certain limitations such as the limitation of the PSQ by subjective interpretations.[7] To determine the degree to which PSQ scores correlate with ratings from general life stress measures, researchers would need to research the topic more in the future. Also, the generalizability is limited by the age group, online sample, and US sample.[7]

Researchers in Romania compared patients diagnosed with bruxism to those who were not diagnosed with bruxism to assess the level of stress present in each group.[8] To conduct this

study, researchers formed a sample of 60 patients ages 25 to 51 and divided them into two groups of 30 patients. Each participant was clinically examined and given two questionnaires.[8] Researchers found that "60% of the patients diagnosed with bruxism presented high levels of stress, a higher percent value in comparison with the group of patients without bruxism, where only 13.33% of them presented high levels of stress."[8]

A strict methodological approach was adopted by a study performed in Brazil to determine the prevalence of bruxism in students at the Federal University of the Jequitinhonha and Mucuri Valleys.[9] Two hundred and fifty-three students ages 18 to 30 of both genders were clinically examined and had to answer a questionnaire to obtain data about possible risk factors related to bruxism. The results indicated that "31.6% of the students had bruxism," and researchers found that stress and temporomandibular joint pain were some of the risk factors associated with bruxism ($p < 0.001$), according to Soares et al.[9] The study had a significant sample size that was representative of the population and the sample was proportionally stratified.[9] "Only one properly trained examiner performed all evaluations, reducing the risk of bias and producing a good level of scientific evidence in the area. This data led to a study with high internal and external validity."[9] Hence, researchers concluded that "students with symptoms of stress and muscle pain had a three times greater chance of developing bruxism compared with individuals who do not have such comorbidities, irrespective of age and gender."[9]

Additionally, in a systematic and meta-analysis review of the risk factors related to bruxism in children, researchers concluded that anxiety and stress is a possible risk factor for developing bruxism.[10]

Based on a study conducted by Emodi-Perlman et al., it was found that among individuals in Poland and Israel, there was an influx in the rate of symptoms related to

temporomandibular disorders and bruxism as a result of the psychological and emotional effects of the COVID-19 pandemic.[11] This study utilized a cross-sectional survey conducted online and received 1096 responses in Poland and 867 responses in Israel. According the study, ". . . unlike the Polish participants, the worry of being contaminated by the virus did not increase the odds of occurrence of AB [awake bruxism] and SB [sleep bruxism], or aggravate the symptoms of the conditions (TMD [temporomandibular disorders], SB, and AB) among the Israeli subjects." [11] From these results, researchers hypothesized that public-health differences between the two countries could be responsible for this finding. As one can predict, it was noted that the likelihood of having sleep bruxism, awake bruxism, or a temporomandibular disorder was higher in Poland than in Israel.[11] However, ". . . [t]he effects of emotional factors and of personal concerns on the associated symptoms and their aggravation were found to be similar in both countries"[11] and that one's likelihood of exhibiting bruxism or a temporomandibular disorder grew notably as a result of depression, anxiety, or generalized concern regarding factors such as well-being and financial aspects of life.[11]

In a cross-sectional study examining the relationship between oral habits, depression, anxiety, and temporomandibular disorders and being isolated from society due to COVID-19, the results of 113 questionnaires were analyzed by researchers.[12] This questionnaire was conducted from May 12 through May 19, 2020 through means of social media and e-mail.[12] The questionnaire was distributed among dental students at the Faculty of Health Sciences of the University of Brasilia. Researchers were able to find that there were several positive correlations between multiple variables.[12] In this study, positive correlations existed between anxiety and oral habits, depression and oral habits, and symptoms of temporomandibular disorders and oral habits.[12] The following p-values for each variable were $p = 0.001$ for symptoms of anxiety and

oral habits, $p<0.001$ for symptoms related to temporomandibular disorders and oral habits, and $p = 0.021$ for depression symptoms and oral habits.[12] The null hypothesis was that there is not an association between symptoms related to depression, anxiety, or temporomandibular disorders and oral habits. Based on the results of this study, researchers concluded that the occurrence of symptoms related to depression, anxiety, and temporomandibular disorders were affected by isolation as a result of the COVID-19 pandemic.[12]

Moreover, in a study conducted by Saccomanno et al., researchers analyzed the results of a questionnaire given to 182 participants.[13] The majority of the participants were women (71.4%).[13] The online questionnaire was administered in Italy from April 18, 2020 through May 3, 2020.[13] This time period corresponded to the end of the quarantine period for COVID-19 in Italy. The questionnaire surveyed participants utilizing the Perceived Stress Scale and the Research Diagnostic Criteria for Temporomandibular Disorders Axis II.[13] Individuals were also assessed based on questions pertaining to stress relating from COVID-19 and facial discomfort. Based on the questionnaire, it was discovered that within the past month (relative to when the study was conducted), 40.7% (74/182) of respondents reported discomfort in the jaw, temples, or face.[13] 74.3% of individuals who reported this pain were women.[13] Additionally, it was reported by 51.4% of those experiencing discomfort that their level of discomfort increased over the past month. 94.7% of these respondents also noted that there was a relationship between a ". . .recently occurring major life event" and their increase in discomfort, according to Saccomanno et al.[13] 45.7% of these individuals loosely hinted at COVID-19 being the event that was the source of their recent increase in facial discomfort.[13]

It was also found that the COVID-19 pandemic has led to worsening temporomandibular joint disorders due to the increase in stress.[14] A prospective cohort study was conducted in Italy

to understand the impact of COVID-19 on the facial pain severity of patients with existing temporomandibular disorders (TMD), researchers compared the results of worsening facial pain and anxiety between those with chronic temporomandibular disorders and those with acute/subacute temporomandibular disorders.[14] Before the Covid-19 pandemic, researchers recruited 19 adults with chronic temporomandibular disorders and 26 adults with acute/subacute temporomandibular disorders. Baseline assessments were collected prior to the start of the pandemic and follow-up assessments were made afterward.[14] Researchers used COVID Stress Scales (CSS) to measure the extent of COVID-related anxiety, stress, and pain. Researchers found that "the CSS was significantly higher for those with chronic TMD [temporomandibular disorders] (median = 52.50) compared to those with acute/subacute TMD [temporomandibular disorders] (median = 30.00)" with a P value of 0.27.[14] An overall increase in stress and facial pain was observed in both groups. They also determined that patients "with chronic TMD [temporomandibular disorders] were more susceptible to COVID-19 distress with deterioration of psychological status, worsening features of central sensitization and increased chronic facial pain severity."[14] There were many limitations associated with this prospective cohort study. The lack of a control group and the limited sample size of participants selected with an unequal distribution of both groups all contributed to the study's limitations. This study "was conducted in one Centre only in one Country, which reduces the external validity and the generalisability of the results."[14] There could have also been other variables that may have been relevant to the study such as measures of pain perception and pain sensitivity that were not measured. However, this study also presents several strengths.[14] Researchers were able to explore the relationship between stress and bruxism-related variables using a prospective study approach. This method

also allowed researchers to decide not only whether people with temporomandibular disorders were affected by COVID-19-related stress, but also how they were affected.[14]

A cross-sectional study was conducted in Indonesia to examine the relationship between stress and bruxism in children ages 9 to11 years.[15] The sample size consisted of 20 children with bruxism and a control group of 20 children who did not have bruxism. A bruxism questionnaire was completed by the children's parents in order to indicate the presence of bruxism and clinical examinations were performed to verify the presence of attrition.[15] The children also completed a Stress in Children questionnaire (SiC) so as to assess their stress level. "The results showed that children with bruxism had a significantly higher SiC score than the non-bruxism children ($p<0.05$). The correlation between stress and bruxism showed a statistically significant relationship ($p<0.05$)."[15] The Spearman's correlation value of 0.66 indicated a strong correlation between stress and bruxism in the positive direction.[15]

An increase in stress was also found to have led to an increase in stomatognathic system disorders.[16] A review of literature was conducted by homeopathic and periodontist researchers in Brazil to examine the correlation of COVID-19 with the stomatognathic system and to assess the benefits of homeopathic therapies in increasing oral and general health during the pandemic. The results have shown that an increase in anxiety and stress during the pandemic can lead to disorders in the stomatognathic system including neuralgic pain in the face and teeth, fractures of teeth and dental prostheses, nibbled mucosa, facial paralysis, pain in the temporomandibular joint, dental tightening, bruxism, and peeling of the mucous membranes and skin.[16] The study also concluded that "homeopathy is a safe and viable therapy for the control of COVID-19 symptoms, as scientific evidence has proven its benefits through clinical trials and use in previous epidemics."[16]

Discussion

All studies used were free of bias and used credible methods of analyzing and reporting data. The studies looked at a variety of population samples from various places during the pandemic, as well as different age ranges and they included both genders. All of the studies found a correlation between anxiety and stress in relation to the COVID-19 pandemic and its effects on bruxism and temporomandibular disorders. The studies were also able to prove that stress played an important role in triggering bruxism and temporomandibular disorders regardless of gender, age, and the presence of other etiological factors. The analysis of these studies support the theory that COVID-19 related stressors have led to the increase and/or worsening of bruxism and temporomandibular disorders. However, further longitudinal studies should be conducted in order to better understand the effects of these COVID-19 stressors on bruxism and temporomandibular disorders.

The study conducted by Saccomanno et al. could be considered a limited study since most participants were women.[13] Having more men included in this study would eliminate bias and also make the results more valid and useful. Based on the results from all of the studies conducted, the effects of mental health on the oral cavity should be addressed in dental practices and clinics worldwide. Practitioners can use the results to educate patients on the importance of self-care during stressful situations and provide referrals and patient resources for those who need additional mental health counseling.

Additionally, the discrepancy between national health care services between Israel and Poland can be examined from the study conducted by Emodi-Perlman et al s ince the results showed that in those living in Israel, symptoms related to temporomandibular disorders and bruxism were not exacerbated by the fear of contracting COVID-19.[11] With this in mind, important conclusions can be drawn about healthcare between Poland and Israel. From this study, public health officials in the two respective countries can conduct further research to pinpoint why those in Poland had bruxism associated with the fear of contracting COVID-19. Researchers could then decide if this fear is prevalent due to inequities in health care between the two countries, or does this issue have a socioeconomic causal factor.

These research findings "suggest that anxiety in response to COVID-19 is not just an initial reaction but potentially the start of a persistent problem that extends beyond the pandemic."[6] Long-term exposure to elevated levels of anxiety is linked to both physiological and psychological costs that may be difficult to reverse. The studies above have also proven that it may have a profound effect on the oral cavity. "Identification of such oral conditions can present a challenge for dental professionals and often goes unnoticed until dental pain or tooth fracture occur."[2] It has been encouraged that dental staff should pay more attention to the spread of such

orofacial disorders during the pandemic. Practicing dentists should become more acquainted with the diagnostic methods of such disorders, their treatment options, and techniques for reducing stress to reduce the spread of such oral complications. Some possible options suggested for the management of bruxism include the use of occlusal guards which could either be customized by the patient's dentist or purchased over the counter. Botox injections could also be a possible treatment option since they act as a "temporary muscle relaxant to control muscle activity and reduce the pain associated with teeth grinding."[2] However, this treatment option needs to be repeated since it usually only lasts for 3–6 months.[2]

Conclusion

In conclusion, studies have shown an increase in stress and anxiety during the COVID-19 pandemic which have led to the development and intensification of bruxism and temporomandibular joint disorders. Dental professionals can use this information to become more aware of the spread of these orofacial disorders during the pandemic and take the initiative to address these concerns by researching the best treatment options and strategies for managing stress and reducing orofacial pain. Additionally, these studies also show the effect of one's psychological condition on the oral cavity and surrounding facial structures. In the future, further research would need to be conducted to better understand the effects of COVID-19 stressors on bruxism and temporomandibular disorders.

References

1. Lee SA. Coronavirus Anxiety Scale: A brief mental health screener for COVID-19 related anxiety. Death Stud. 2020;44(7):393-401. doi: 10.1080/07481187.2020.1748481. Epub 2020 Apr 16. PMID: 32299304.
2. Hassan KA, Khier SE. Awake Bruxism Intensified During COVID-19 Pandemic by Cumulative Stress – An Overview. Journal of Clinical Research in Dentistry [Internet]. 2020Dec [cited 2021Mar3];3(1):1–3. Available from: https://www.researchgate.net/profile/Khamis-Hassan/publication/347907088_Awake_Bruxism_Intensified_During_COVID-19_Pandemic_by_Cumulative_Stress_-_An_Overview/links/5fe6970a45851553a0ef56f0/Awake-Bruxism-Intensified-During-COVID-19-Pandemic-by-Cumulative-Stress-An-Overview.pdf
3. Talevi D, Socci V, Carai M, Carnaghi G, Faleri S, Trebbi E, di Bernardo A, Capelli F, Pacitti F. Mental health outcomes of the CoViD-19 pandemic. Riv Psichiatr. 2020 May-Jun;55(3):137-144. doi: 10.1708/3382.33569. PMID: 32489190.
4. Almeida-Leite CM, Stuginski-Barbosa J, Conti PCR. How psychosocial and economic impacts of COVID-19 pandemic can interfere on bruxism and temporomandibular disorders? J Appl Oral Sci. 2020;28:e20200263. doi: 10.1590/1678-7757-2020-0263. Epub 2020 May 11. PMID: 32401942; PMCID: PMC7213779.
5. Liu F, Steinkeler A. Epidemiology, diagnosis, and treatment of temporomandibular disorders. Dent Clin North Am. 2013 Jul;57(3):465-79. doi: 10.1016/j.cden.2013.04.006. PMID: 23809304.
6. Flaskerud JH. Stress in the Age of COVID-19. Issues Ment Health Nurs. 2021 Jan;42(1):99-102. doi: 10.1080/01612840.2020.1829217. Epub 2020 Oct 21. PMID:
7. Kujawa A, Green H, Compas BE, Dickey L, Pegg S. Exposure to COVID-19 pandemic stress: Associations with depression and anxiety in emerging adults in the United States. Depress Anxiety. 2020 Dec;37(12):1280-1288. doi: 10.1002/da.23109. Epub 2020 Nov 10. PMID: 33169481.
   33086023.
8. Raftu G, SIN E-C, CARAIANE A, BUŞTIUC S-G. A Study on the Perceived Level of Stress in a Group of Adult Patients Diagnosed with Bruxism. International Journal of Medical Dentistry [Internet]. 2019;23(1):101–5. Available from: http://search.ebscohost.com.proxy.library.vcu.edu/login.aspx?direct=true&AuthType=ip,url,cookie,uid&db=ddh&AN=135885084&site=ehost-live&scope=site
9. Soares LG, Costa IR, Brum Júnior JDS, Cerqueira WSB, Oliveira ES, Douglas de Oliveira DW, Gonçalves PF, Glória JCR, Tavano KTA, Flecha OD. Prevalence of bruxism in undergraduate students. Cranio. 2017 Sep;35(5):298-303. doi: 10.1080/08869634.2016.1218671. Epub 2016 Aug 12. PMID: 27684574.
10. Guo H, Wang T, Niu X, Wang H, Yang W, Qiu J, Yang L. The risk factors related to bruxism in children: A systematic review and meta-analysis. Arch Oral Biol. 2018 Feb;86:18-34. doi: 10.1016/j.archoralbio.2017.11.004. Epub 2017 Nov 11. PMID: 29149621.

11. Emodi-Perlman A, Eli I, Smardz J, Uziel N, Wieckiewicz G, Gilon E, Grychowska N, Wieckiewicz M. Temporomandibular Disorders and Bruxism Outbreak as a Possible Factor of Orofacial Pain Worsening during the COVID-19 Pandemic-Concomitant Research in Two Countries. J Clin Med. 2020 Oct 12;9(10):3250. doi: 10.3390/jcm9103250. PMID: 33053640; PMCID: PMC7601612.
12. Medeiros RA, Vieira DL, Silva EVFD, Rezende LVML, Santos RWD, Tabata LF. Prevalence of symptoms of temporomandibular disorders, oral behaviors, anxiety, and depression in Dentistry students during the period of social isolation due to COVID-19. J Appl Oral Sci. 2020 Nov 30;28:e20200445. doi: 10.1590/1678-7757-2020-0445. PMID: 33263648; PMCID: PMC7714260.
13. Saccomanno S, Bernabei M, Scoppa F, Pirino A, Mastrapasqua R, Visco MA. Coronavirus Lockdown as a Major Life Stressor: Does It Affect TMD Symptoms? Int J Environ Res Public Health. 2020 Nov 30;17(23):8907. doi: 10.3390/ijerph17238907. PMID: 33266130; PMCID: PMC7731003.
14. Asquini G, Bianchi AE, Borromeo G, Locatelli M, Falla D. The impact of Covid-19-related distress on general health, oral behaviour, psychosocial features, disability and pain intensity in a cohort of Italian patients with temporomandibular disorders. PLoS One. 2021 Feb 2;16(2):e0245999. doi: 10.1371/journal.pone.0245999. PMID: 33529226; PMCID: PMC7853459.
15. Ramdhini DM, Budiardjo SB, Suharsini M. Relationship between Stress and Bruxism in Children Aged 9-11 Years. Journal of International Dental & Medical Research [Internet]. 2018 [cited 2021Mar3];11(3):997–1001. Available from: http://search.ebscohost.com.proxy.library.vcu.edu/login.aspx?direct=true&AuthType=ip,url,cookie,uid&db=ddh&AN=134101206&site=ehost-live&scope=site
16. Padre A, Mourão LC. Correlation of Covid-19 With Stomatognathic System With Homeopathic Proposal for Adjunct Treatment to Increase Oral and General Health. Altern Ther Health Med. 2020 Aug;26(S2):112-116. PMID: 33245703.